

# Jingqi Huang

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## EDUCATION

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### Purdue University

Ph.D. in Computer Science

West Lafayette, IN

August 2020 - May 2025 (Expected)

### University of California, San Diego

M.S. in Electrical and Computer Engineering

La Jolla, CA

September 2018 - March 2020

### Beijing University of Posts and Telecommunications

B.E. Internet of Things Engineering

Beijing, China

August 2014 - June 2018

## SYSTEMS & PROGRAMMING SKILLS

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- Languages: Python, Go, Java, Bash, C/C++, P4, Matlab, HTML/CSS and SQL/NoSQL
- Technologies: Kubernetes, Docker, Ansible, Helm, MongoDB, Git, gRPC, RESTful API, Prometheus, Grafana, Network System, Mobile Network, Cloud Computing, Distributed System, Mobile Computing, SDN, Mininet, Wireshark

## SELECTED AWARDS AND RECOGNITIONS

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- **2022 Meta PhD Research Fellowship Finalist for Networking**
- 2022 Intel Intern Recognition
- Beijing University of Posts and Telecommunications Scholarship for Undergraduate Education (2015–2017)

## WORK EXPERIENCE

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### Intel Labs

Research Scientist Intern

Hillsboro, OR

May 2023 – September 2023

- Profiled and optimized a distributed, microservice-based cloud-native application, Intel Aether SD-Core, which is a microservice-oriented **5G mobile core network** built with **Go** and orchestrated with **Kubernetes**.
- Identified bottlenecks of the user-observed end-to-end latency of high execution time of serialization/deserialization and high read/write IO between the application and database using **Go pprof**.
- Added **Redis** support to reduce the data access latency up to  $\sim 75\%$  compared to previous MongoDB solution.
- Identified the bottleneck in load balancer, HTTP marshaller/unmarshaller and Go scheduler under large-scale users in the adapter between the control plane and data plane and reported to the Intel team for further optimization.
- This work is featured in the Intel Labs Intern Lightning talk.

### Intel Labs

Research Scientist Intern

Hillsboro, OR

May 2022 – August 2022

- Developed stateless microservices and related features in Intel Aether SD-Core using **Go** to provide high availability and scalability while ensuring resource usage efficiency and low user-observed end-to-end latency. [2, 3]
- Designed and implemented a microservice using **Go** to connect to multiple control plane microservices with HTTP interfaces, and the data plane with a PFCP interface.
- Developed high availability features for the stateless microservices using **Go** and **MongoDB**, including load balancer, keep-alive to ensure user requests can be handled under microservices failure.
- Designed auto-horizontal **Kubernetes** pod scaling mechanism to reduce user observed end-to-end latency by  $\sim 50\%$ .
- This work has been open-sourced by Intel.

### Purdue University

Graduate Research Assistant

West Lafayette, IN

January 2021 – Present

- Profiled and analyzed the system workload of stateful Intel Aether SD-Core. Deployment and profiling tools include **Python**, **Ansible**, **Kubespray**, **RKE2**, **Helm**, **Prometheus**, **Grafana**, **Go pprof**, and **Open telemetry**. [2, 3, 4]
- Pinpointed latency bottleneck of the Intel Aether SD-Core in high execution time of message serialization/deserialization (up to  $\sim 60\%$ ) and high contention time for resources of 5G mobile core microservices (up to  $\sim 70\%$ ).
- Intel Aether SD-core project has adopted and open-sourced our development and debugging effort.
- One first-author paper in submission.

### Intel Labs

Research Scientist Intern

Hillsboro, OR

May 2021 – August 2021

- Implemented in-network ML aggregation and Map/Reduce operations on programmable data planes to reduce training and inference latency in distributed machine learning using **P4**, **Python**, **Bash** and **BMV2**.
- This work reduced the network latency by  $\sim 4\times$ , and saved the network bandwidth by  $\sim 3\times$ .

## University of California, San Diego

Research Assistant

La Jolla, CA

Sep 2018 – Mar 2020

- Implement and evaluate vehicle-to-everything (V2X) communication over millimeter-wave network use case for 5G New Radio use case using mmWave access points **Airfide Sparow+**, **Matlab**, **Python** and **Bash**. Profiling results guide the mmWave beamforming management mechanisms and interference cancellation. [5]
- Designed and developed X-Array for prototyping and evaluating omnidirectional millimeter-wave (mmWave) network using mmWave access points **Airfide Sparow+**, **Matlab**, **Python**, and **Bash**. [6]

## Beijing University of Posts and Telecommunications

Research Assistant

Beijing, China

Jan 2017 – Jun 2018

- Designed and developed KPad [9], a system to increase channel utilization in Wi-Fi MU-MIMO.
- Developed Romil [1, 8] for robust indoor mmWave communication.

## PUBLICATIONS

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### Journal Articles

1. Anfu Zhou, Shaoqing Xu, Song Wang, **Jingqi Huang**, Shaoyuan Yang, Teng Wei, Xinyu Zhang, and Huadong Ma. Robotic Millimeter-Wave Wireless Networks. **IEEE/ACM Transactions on Networking**, 28(4):1534–1549, 2020

### Conference and Workshop Papers

2. **Jingqi Huang**, Bilal Saleem, Jiayi Meng, Iftekharul Alam, Christian Maciocco, Y. Charlie Hu, and Muhammad Shahbaz. Towards a Performant and Scalable Cloud-Native 5G Mobile Core Architecture. In **SRC TECHCON**, 2023
3. Jiayi Meng, **Jingqi Huang**, Y Charlie Hu, Yaron Koral, Xiaojun Lin, Muhammad Shahbaz, and Abhigyan Sharma. Characterizing and Modeling Control-Plane Traffic for Mobile Core Network. In **ACM Internet Measurement Conference (IMC)**, 2023
4. **Jingqi Huang**, Jiayi Meng, Iftekharul Alam, Christian Maciocco, Y. Charlie Hu, and Muhammad Shahbaz. Accelerating 5G (Mobile Core) Control Plane using P4. In **P4 Workshop**, 2022
5. Haotian Deng, Qianru Li, **Jingqi Huang**, and Chunyi Peng. iCellSpeed: Increasing Cellular Data Speed with Device-Assisted Cell Selection. In **ACM MobiCom**, 2020
6. Song Wang\*, **Jingqi Huang\***, and Xinyu Zhang. Demystifying Millimeter-Wave V2X: Towards Robust and Efficient Directional Connectivity Under High Mobility. In **ACM MobiCom**, 2020. (\*Equal contribution)
7. Song Wang\*, **Jingqi Huang\***, Xinyu Zhang, Hyoil Kim, and Sujit Dey. X-array: Approximating Omnidirectional Millimeter-Wave Coverage Using an Array of Phased Arrays. In **ACM MobiCom**, 2020. (\*Equal contribution)
8. Anfu Zhou, Shaoqing Xu, Song Wang, **Jingqi Huang**, Shaoyuan Yang, Teng Wei, Xinyu Zhang, and Huadong Ma. Robot Navigation in Radio Beam Space: Leveraging Robotic Intelligence for Seamless mmWave Network Coverage. In **ACM MobiHoc**, 2019
9. Song Wang\*, **Jingqi Huang\***, and Anfu Zhou. KPad: Maximizing Channel Utilization for MU-MIMO Systems Using Knapsack Padding. In **IEEE ICC**, 2018. (\*Equal contribution)

## CORE CURRICULUM

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- **Ph.D.:** Datacenter and Cloud Networks, Data Communication and Computer Networks, Database Systems, Distributed Database Systems, Algorithm Design Analysis & Implementation, Data Mining, Statistical Machine Learning
- **Master:** Software Foundations I, Linear Algebra and Application, Multi User Communication system, Digital Communications, Principles of Wireless Networks, Probabilistic Coding, Special Topic in Signal & Image/Robotic, Big Network Data
- **Undergraduate:** Operating System, Cloud Computing, Databases, Software Engineering, Data Structure, Introductory Java Programming, Signals and Systems, Product Development, Network and Protocols, Security and Authentication, Middleware